



Center for Energy Efficient
Electronics Science

Theme 2: Nanomechanics



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Students: Aldo Vidaña, Edgar Acosta, Raquel Zubia

Daniel Rodriguez (UG RA), Andres Sagredo (ETERN)

Professors: David Zubia, Dr. Jose Mireles (UACJ Mexico)

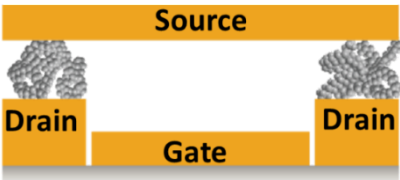


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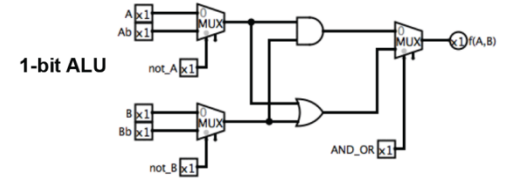
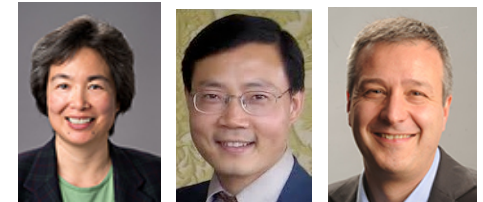
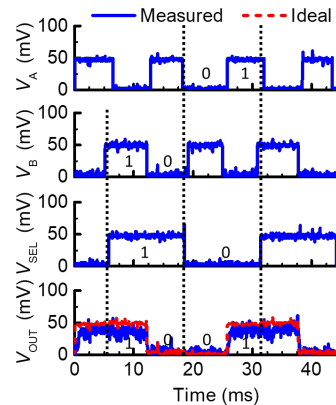
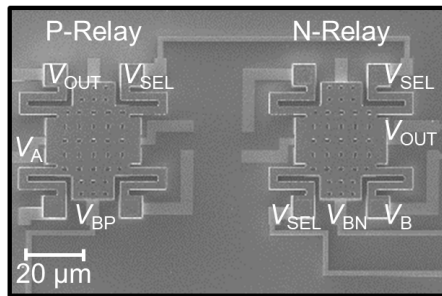
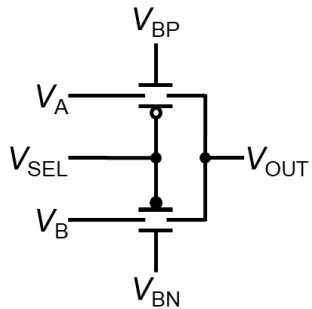
E3S Center Annual Retreat
September 19, 2019

Theme II Projects & PIs

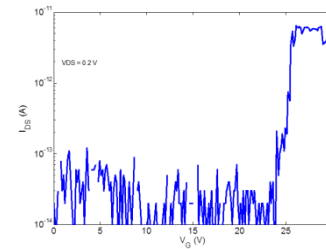
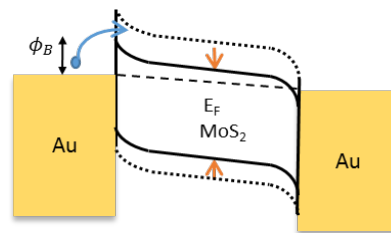
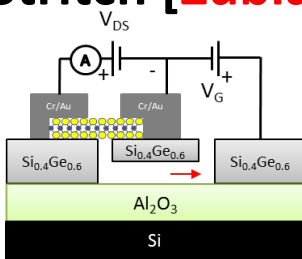
- **Squitch** [Niroui, Lang, Bulović, Kong, Swager]
 - Nanofabrication



- **Low-Voltage Relay Integrated Circuits** [Liu, Wu, Stojanović]
 - Sub-50 mV circuit demonstration



- **Stritch** [Zubia]
 - Low-voltage actuator design for inducing strain in 2-D materials



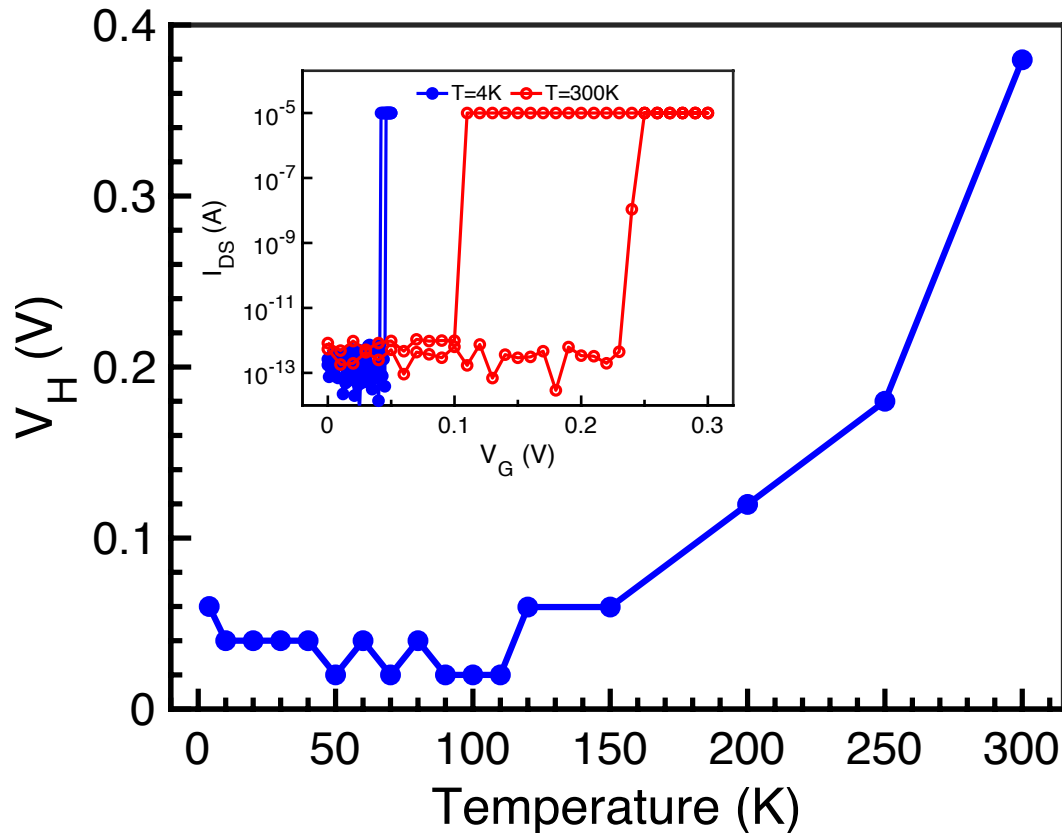
Theme II Presentations

- **Squitch update (Farnaz Niroui)**
- **Anti-stiction coatings (Junqiao Wu)**
- **Cryogenic operation (Tsu-Jae Liu)**
- **Stritch update (David Zubia)**



Cryogenic Relay Operation

See poster by Xiaoe Hu *et al.*

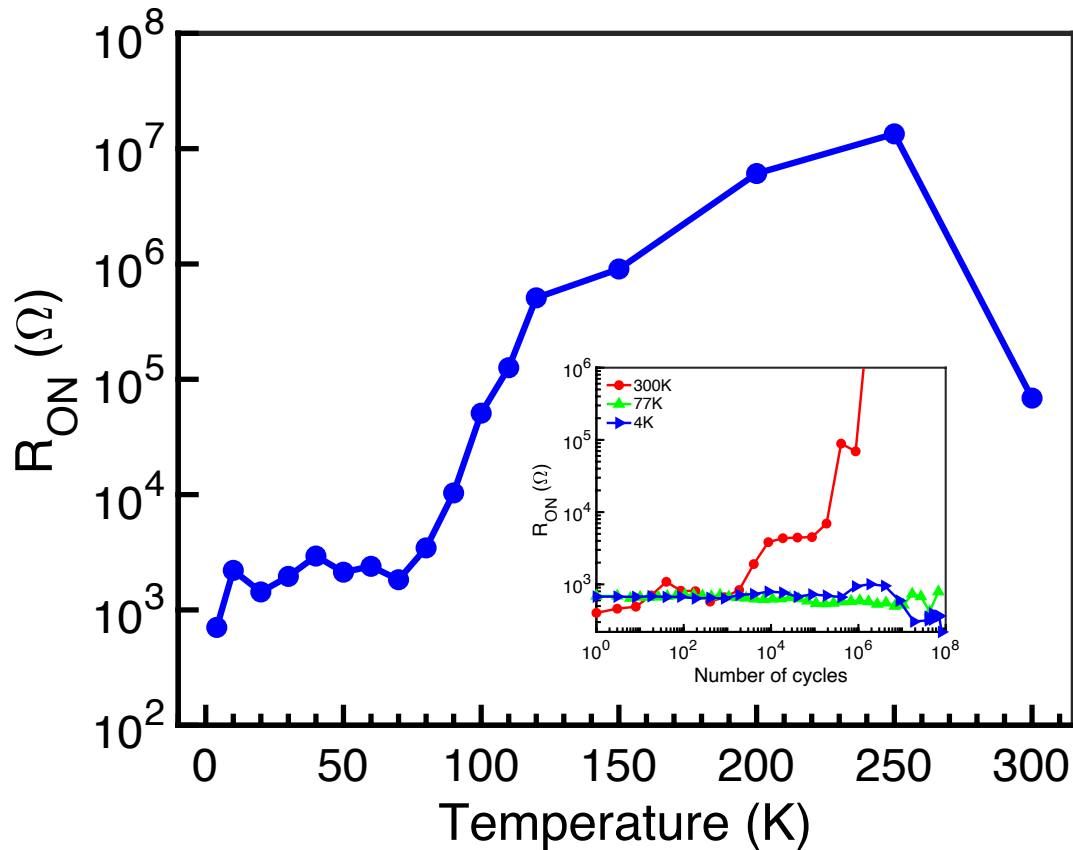


- Hysteresis voltage (V_H) decreases with reduction in operating temperature
 - ➔ Lower contact adhesive force
 - ➔ Lower voltage operation is possible for cryogenic applications



Cryogenic Relay Operation (cont'd)

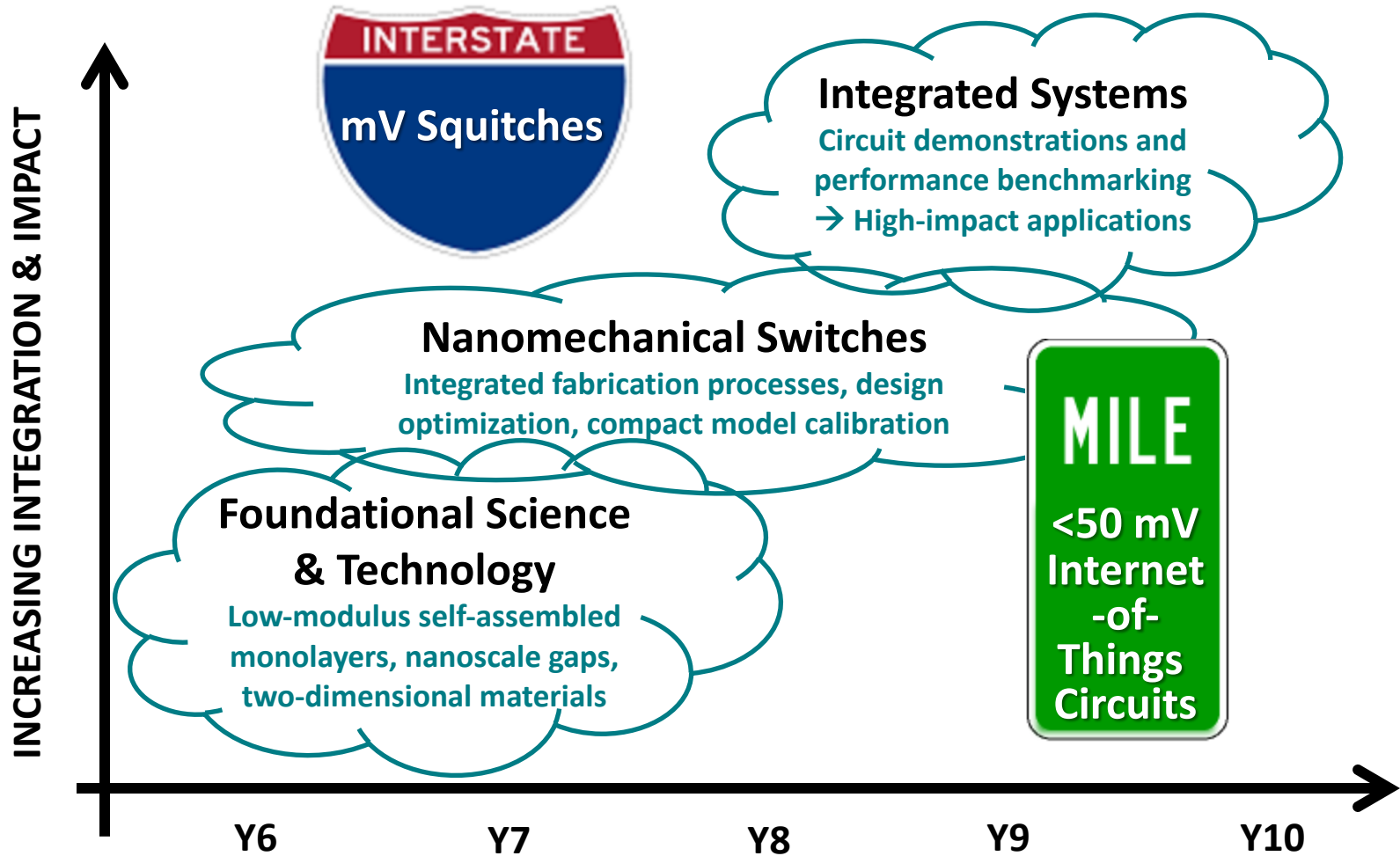
See poster by Xiaoer Hu *et al.*



- Contact resistance (R_{ON}) decreases with reduction in operating temperature
 - ➔ Contact oxidation does not occur below 90 K
 - ➔ More stable operation is possible for cryogenic applications



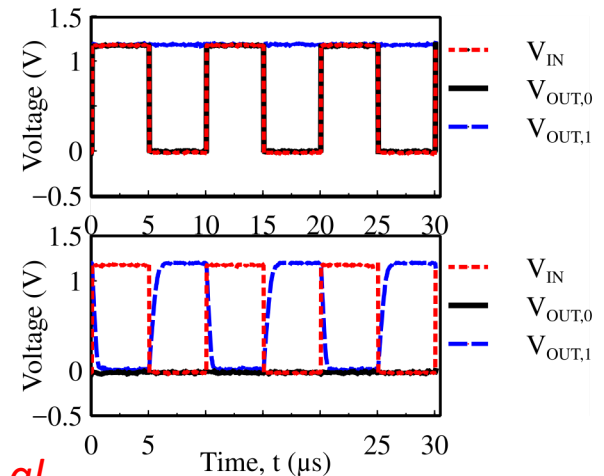
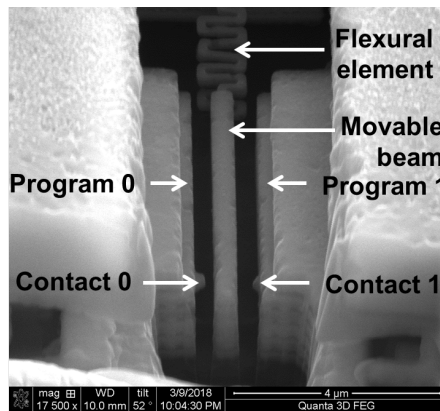
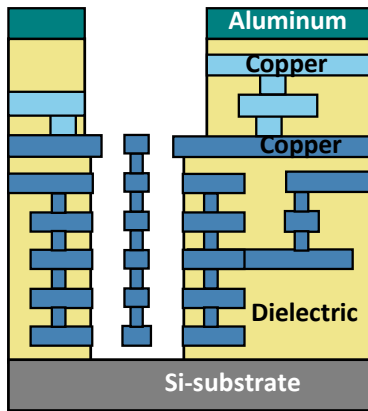
Theme II (Nanomechanics) Roadmap



Theme II Legacy

- milliVolt nanomechanical digital computation across a wide range of operating conditions
- Stritch
- Squitch
- BEOL switches (reconfigurable interconnects)

➤ E-book



See poster by Urmita Sikder *et al.*